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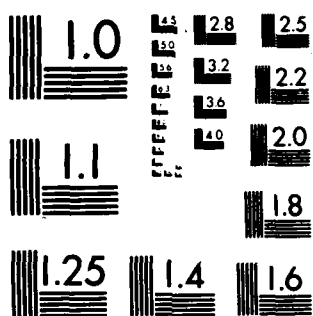
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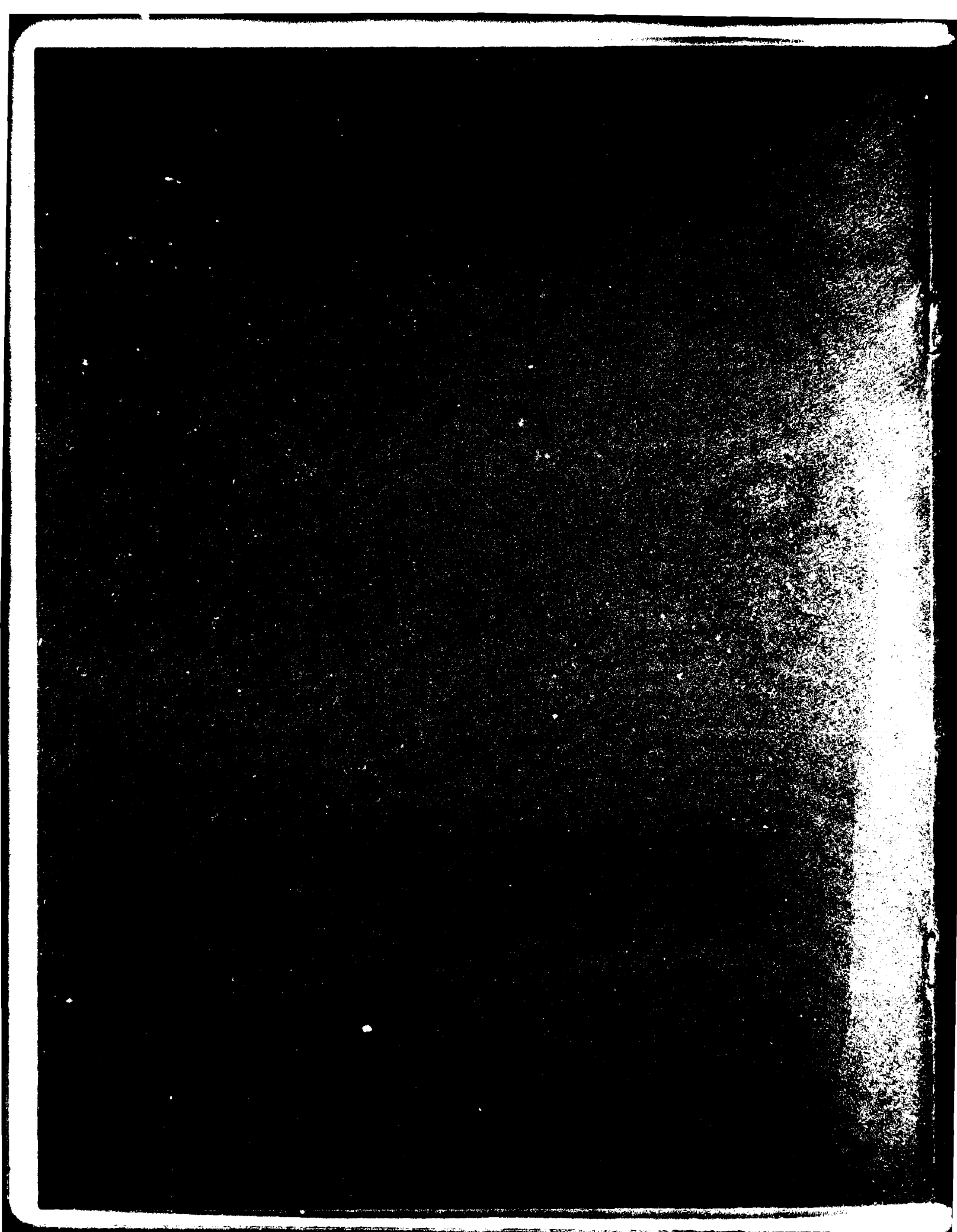
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↙ This study attempts to measure one very widespread type of export subsidy, the export credit guarantees and insurance policies offered by the exporting governments. Section II of the Note gives an overview of some of the most important features and introduces the necessary terminology. Section III concentrates on estimating the perceived probability of nonpayment and the salvage ratio, which are the major determinants of the risk premium that would be charged in a competitive market. The machinery developed in Sections II and III is then applied to estimating the subsidies on exports to the Eastern Bloc in Section IV. Export subsidies are usually justified on the basis that they increase exports--and therefore production, employment, and income--in the exporting country. Section V develops a simple model of the economy that lets the reader determine for which values of subsidy rates and export price elasticities this is indeed true. Some concluding thoughts follow in Section VI.

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## A RAND NOTE

SUBSIDIZATION OF EAST-WEST TRADE THROUGH  
CREDIT INSURANCE AND LOAN GUARANTEES

Daniel F. Kohler, Kip T. Fisher

January 1983

N-1951-USDP

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PREFACE

This Note was produced for the Office of the Under Secretary for Policy in the U.S. Department of Defense. The authority for the research is contained in DoD Policy Research Memorandum No. I-11541/82 of July 20, 1982. It is part of Rand's research program on international economic policy and should be of interest to policymakers concerned with West-East resource flows and the extent to which these relations may directly or indirectly affect military spending in the Soviet Union. It might also help inform the current debate on international export competition and the problems of excessive debt burdens by some borrowing countries (or excessive lending by Western banks and governments).



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SUMMARY

Export subsidies play an important role in international trade. To the extent that these subsidies benefit the importers, but are borne by the people of the exporting country, they entail real resource transfers that may be substantial. If the importer is furthermore a strategic adversary, such resource transfers raise serious questions of concern to national security policymakers.

This study attempts to measure one very widespread type of export subsidy, the export credit guarantees and insurance policies offered by the exporting governments.[1] This does not provide us with a measure of West-East resource flow. However, it does let us examine the size of an often overlooked portion of this resource flow and thus aids in gaining a better appreciation of its importance.

The subsidy due to official export credit guarantees and insurance is the amount by which the government's risk assumption reduces the financing costs. Even if the government charges a fee or insurance premium for this service and this fee is added to the financing costs, the resulting interest rates are considerably below what risky borrowers would have to pay in an open market.

What a risky borrower would have to pay in the absence of government guarantees is a hypothetical question. The simple fact that government guarantees are available, at little or no cost, prevents us

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[1] Another form of export subsidy involves the granting of direct credits at rates below the government's own cost of funds. An unpublished study by the secretariat of the Organization for Economic Cooperation and Development (OECD) estimated the cost of these subsidies to be \$5.5 billion in 1979. More recent estimates are around \$7 billion.

from observing that rate. However, if we can find out how risky a specific borrower looks to a lender, we can calculate which rate the lender would have to charge on uninsured loans to have the same expected return as on perfectly safe or insured ones.

We investigate a number of ways that let us infer how risky the market perceives loans to the Eastern bloc from data on insured loans. Using these estimates we calculate interest rates that would have to be paid on equally risky but uninsured loans. The difference between these two rates, six to eight percentage points,[2] implies an annual subsidy to the communist world on the balance owed to all OECD countries of around \$2.5 billion, \$1.1 billion of this to the Soviet Union and its allies.

Another way in which government guarantees lead to subsidies is in reschedulings. Since 1970 the governments of the OECD countries have agreed to reschedule a debtor government's loans on over 50 occasions. Poland alone had its official and officially guaranteed debt rescheduled three times, and it is likely to be coming up again in the near future.

In a rescheduling, lending governments usually agree to extend the loans coming due and maybe even grant new ones, at the lending government's cost of funds. This rate--the Treasury bill rate in the United States--is, of course, considerably below what a risky borrower who is already behind in his payments would have to pay in an unsubsidized market. For the Polish rescheduling of 1981 we estimate this subsidy to be about \$700 million.

Some argue that government guarantees are necessary to protect exporters, because no private market equivalents exist. Aside from the

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[2] For some countries (such as Poland) this spread may range up to 12 or 15 percentage points.

fact that such an argument is a non sequitur (the government does not have to provide services not provided by the private market), it is also mistaken about the facts. Private insurance companies have always provided insurance against commercial export risks, and a small but growing number of them also offer protection against political risks. The business volume of these private political risk insurers in the United States accounts for approximately 30 to 50 percent of the entire insured volume.

There are several revealing differences between the operations of private and official insurers of credit risks. Private insurers, for example, always require the exporter seeking coverage to carry some of the risk himself. They also adjust their rates to reflect differences in perceived risks and in case of a default have much more stringent collection procedures. If they agree to a rescheduling, it is certainly not at the Treasury bill rate. They can therefore keep their losses to a minimum. The present system gives a borrower every incentive to pay off privately insured and self-insured lenders before paying officially insured ones. Indeed, some privately insured companies appear to be receiving payments from Poland at present, while the Commodity Credit Corporation (CCC), the official insurer of commodity exports from the United States, is not even receiving the interest on the rescheduled Polish loans.

A more substantial argument in favor of export subsidies is that they create employment and thus increase national income and welfare. However, we find that export subsidies are unlikely to have this effect. Furthermore, this result is independent of whether the export subsidies were granted unilaterally or in response to subsidization by a

competitor. This calls into question the announced policy of all OECD countries, including the United States, that threaten to counter competitor subsidies with subsidies of their own.

The estimates arrived at in this study have a very large margin of error. Although we believe that our methodology is sound, we simply do not yet have sufficient data to which we could apply our formulas with a high degree of confidence. But even when we have more precise estimates, our figures still can not be interpreted as a measure of total subsidies or of the net resource flows to the Eastern bloc. To obtain an estimate of the total subsidy on West-East trade we would have to add to our figures the interest rate subsidies on direct export credits and government-to-government loans as well as all the indirect subsidies implicit in compensating trade deals and the like. To estimate what portion of this total subsidy accrues to the Eastern bloc we would need to know the elasticity of import demand by the East. Such calculations were outside the scope of this study.

ACKNOWLEDGMENTS

A great number of people contributed to this Note by providing information and advice. Representative for all of them, I would especially like to thank Frank Nee of PEFCO, Lester LeCompte of the CCC, John D. Lange at the Department of the Treasury, James Libera at the State Department, James Hess of the EXIM Bank, Robert Frank of Chubb and Son, Inc., and Robert Svensk of AIG for their interest and the patience with which they answered my questions. Rand colleagues Steven Salant and Charles Wolf provided valuable advice and criticism, which improved this Note considerably; and Helen Turin's careful editing made it readable. However, none of these people should be held responsible for any remaining shortcomings.

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## I. INTRODUCTION

Most industrialized countries have agencies charged by the government to promote and support exports. Such agencies as the Export Import Bank (EXIM Bank) in the United States, Compagnie Française d'Assurance pour le Commerce Extérieur (COFACE) in France, HERMES Versicherungs AG in the Federal Republic of Germany (FRG) among others,[1] do this essentially in two ways: (1) They provide financing for exports at interest rates below market rates, and (2) they guarantee payment of credit extended to foreign buyers either by the exporter himself or by a private bank in the exporting country.

It is straightforward to measure the extent of the subsidy on exports due to the provision of financing at below market rates. The difference between the rates actually charged for export credits and the government's own cost of funds is the rate of subsidy. Applying this rate to the balance outstanding at the end of 1980 (approximately \$230 billion) results in estimates of annual subsidies in excess of \$7 billion. For the United States alone these estimates amount to \$660 million.[2]

But these are only partial figures. They are based on an unpublished study by the OECD Secretariat, the so-called Wallen Report. Details of this study are sensitive and the report is not publicly

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[1] A brief description of the major systems is provided in the appendix.

[2] See for example the testimony by John D. Lange, Acting Deputy Assistant Secretary of the Treasury for Trade and Investment Policy, before the Subcommittee on International Economic Policy and Trade, Committee on Foreign Affairs, U.S. House of Representatives, November 18, 1981.

available. However, the overall findings and the method used to arrive at them are common knowledge.

Our study does not attempt to replicate Wallen's estimates. Instead we concentrate on the subsidy that export credits enjoy because of the government's assumption of risk. The volume of loans affected by this subsidy is much larger than the volume benefitting from the first subsidy, because it includes not only loans extended by the government directly, and thus at its own risk, but also all the loans made by private lenders but guaranteed or insured by the government. Suppose, for example, the export credit agencies provided credits at their government's risk-free marginal cost of funds so that they are covering their financing costs. In the absence of any government intervention, however, some of the borrowing countries would have to pay an interest rate considerably above the exporting country's borrowing rate. The borrowers would then still benefit from a subsidy, but the Wallen measure would erroneously indicate the absence of any subsidies. The same holds true for credits extended by private banks but guaranteed by the exporting governments through the export credit and guarantee agencies. Such a system allows the borrowers to obtain funds at rates considerably below what they would have to pay in the absence of any action by the government; and based on the Wallen measure, we would again erroneously conclude that the subsidy is zero.

The Wallen measure underestimates the true subsidy because it does not take into account the costs of assuming risks. Private firms that specialize in providing this service, such as insurance companies, charge a fee. Investors who have to carry risks themselves charge higher interest rates. But many exporting governments provide this service free or at nominal rates, which amounts to subsidizing export credits.

Some authors, among them Arrow and Lind (1970) and Samuelson (1964), have argued that the government is better able to spread risk and could thus be justified in using a lower discount rate than private firms. Others, among them Hirshleifer (1966) and Diamond (1967), disagree, arguing that in a world of stock and bond markets, private individuals and firms can spread risk equally well by diversifying their portfolios. Stapleton and Subrahmanian (1978) have even argued that, because government spreads the risks of its investments along arbitrary lines through the tax system, it cannot equate the marginal riskiness of its projects with the marginal risk preferences of its "stockholders" (taxpayers), making its risk distribution less efficient than what it would otherwise be. Consequently, government should use a higher discount rate than the free market would indicate.

Sandmo (1974) and Holmstrom (1980) have resolved this dispute by noting the importance of market structure. If a government operates in markets where private firms are also present, and if the shares of the private firms are traded efficiently, there is little justification for government to use a discount rate different from what the private firms would use. However, in imperfect markets, for example for public goods, a different discount rate for government investments may be justified.

For "investments" in export credit guarantees there is little justification for using a discount rate different from what the private market would charge. Private market equivalents do exist, private insurers do offer insurance policies similar to the ones offered by the official export guarantee agencies, and there are no obvious public goods aspects to the output produced.[3] We will therefore measure the

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[3] Official and private foreign credit risk insurance policies are close but not perfect substitutes. We believe the differences,

social cost of extending a loan to a risky borrower by the discount rate at which a private uninsured lender would charge, regardless of whether the government or the private lender makes the loan. The subsidy is then the difference between this rate and the rate charged when the government assumes the risks either by making the loan directly or by guaranteeing payment to the private lender.

In the case of direct credits, the taxpayers, through their governments, are both risk takers and investors. In the case of insurance policies and guarantees, they are only risk takers, the investors being the banking community extending the loans. But our measure remains valid. The subsidy is still the difference between the fully risk-adjusted rate and the actually paid rate. A government guarantee makes investments in export credits or in government securities almost equally safe, so this rate is usually very close to the Treasury bill (T-bill) rate.

This measure neglects the interest-rate subsidy granted on direct export credits. In our calculations we always assume that the borrower pays the marginal cost of funds to the lender. For direct credits, the marginal cost of funds corresponds to the rate paid on government securities. In the United States this rate is commonly known as the T-bill rate.

Some of the costs of this type of export subsidy are borne by the taxpayers from the moment the subsidy is extended, rather than only

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explained in more detail in Sec. III, are minor and certainly justify neither the large differences in premiums charged nor the claim that the government has to provide export risk insurance because the private market won't.

after a default occurs. By reducing the riskiness of securities of export firms, the government directs investment funds from domestic projects toward the export industry. Such changes embody not only direct costs and welfare transfers but also cause some general efficiency ("deadweight") losses for the economy as a whole. In this report we abstract from such indirect costs. We consider only the direct costs that can be measured by the reduction in the interest rate because of the transfer of risk to the government.

If the official export credit and guarantee agencies were private firms with stockholders, they would have to offer a substantial premium to investors to compensate them for the risks they assume in purchasing securities from a firm with assets of such poor quality.[4] But by pledging its "full faith and credit," the government transfers all risk from the investor to the taxpayer. This enables the EXIM Bank and its counterparts in other countries to reduce their cost of funds substantially. It is the subsidy due to this transfer of risk that we seek to estimate.

#### METHODOLOGY FOR ESTIMATING THE RISK BEARING INTEREST RATE

On export credits, the risks are of course partial or complete default. Default is not a random event, like a flood or an earthquake. Rather we view it as occurring in a situation where the borrower finds it in his interest not to repay a loan. The circumstances in which the borrower makes this decision may be exogenous, but the decision itself is not.

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[4] The term "risk premium" here reflects the surcharge over the risk-free interest rate that reflects the riskiness of a loan. This differs from the usage of "risk premium" in some of the economics literature as the premium needed to make an unfair gamble actuarially fair.

The probability of nonpayment ( $P$ ) is not the only parameter that influences the riskiness of a specific loan, and thus the risk premium demanded on it. Of equal importance is what happens to the loan payments when they become overdue. It is incorrect to assume that these debts are simply wiped out, even if a borrower is officially declared in default. Rather, a certain proportion of the delinquent payments will be paid at a later date, perhaps along with some overdue interest.

The ratio of the present value of this future payment stream to the amount of the payment due we define as the salvage ratio  $s$ . If  $s$  is close to one, investors may be willing to accept a fairly large  $P$ , knowing that even though there was a great probability that they would not get paid on time (large  $P$ ), they would be able to salvage a considerable proportion of their capital and interest (large  $s$ ). [5] This tradeoff has to be kept in mind.

Disaggregating the foreign credit risks in this manner is a useful analytic device. However, we are unable to infer  $P$  and  $s$  separately from the available data, nor do we need to. We can evaluate all the formulas that we develop by using a single measure of risk, say  $w$ , defined as  $w = P(1 - s)$ .

The availability of low-cost credits and guarantees leads to a situation where a large share of export credits are financed under such a program. As a result, it is difficult to observe a market for export credits free of government support, and the question of how high the

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[5] One of the arguments in favor of export guarantees is based on the presumption that for international transactions  $s$  is very low. The distance between lender and borrower makes it difficult for the former to press his claims, and any assets that might be attached are usually under foreign jurisdiction.

risk bearing interest rate is becomes hypothetical. Nevertheless we know that a risk neutral lender would charge an interest rate that depended on his subjective assessment of the risks involved. Because he always has the opportunity to purchase government bonds, which are essentially risk free, he will make a risky loan only if the expected return from this investment[6] is at least equal to the return he could earn on risk-free government bonds.

Unfortunately, we cannot observe directly how the investors evaluate the different risks, but by observing the rates actually charged for export credits and comparing them with the risk-free government bond rates, we can indirectly infer how the market perceives the risks. This is possible because, despite the government guarantee, export credits are not completely risk free. Under most systems the lender or exporter is required to carry some coinsurance--the government guarantees cover less than the full amount of the loan. The rates charged for government insured or guaranteed loans will therefore reflect the risk premium the lender charges to protect himself against losing the uninsured portion.

As an alternative source of information on the perceived riskiness of export credits we consider the premiums charged by private insurance companies. Private insurers do offer insurance against the types of risks insured through the official export credit agencies; but unlike the official guarantee agencies, the fees that they collect must cover their costs and thus reflect the risks that they assume.

It does not matter whether the measures of risk that we arrive at in this manner are "objective" or not, or whether they reflect the

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[6] The nominal return weighted by the probability of being repaid.

actuarial probability of nonpayment and inability to recover the loan. The rate that a borrower would have to pay in the absence of officially supported insurance and guarantees does not depend on the objectively evaluated risks but on the market's perception of the risk. The subsidy implicit in official guarantees is defined as the difference between what a borrower ends up paying under an official guarantee scheme and what he would have to pay in the absence of any government risk assumption. To evaluate this fully risk-bearing interest rate, and thus the subsidy, it matters little how objective the market's perception of the risk is.

There is a valid presumption that in a competitive market dominated by profit-maximizing lenders, where information flows quickly (all attributes of the international financial markets), subjective factors that might influence the assessment of risk--prejudice, discrimination, etc.--are unimportant because they lead to a suboptimal allocation of the lender's resources. If private bankers are reluctant to deal with a specific borrower it is because they have reservations grounded in an objective assessment of the risks involved. The result is that the market's average perception of  $P$  and  $s$  is likely to be a quite accurate estimator of the real risks involved.

A more serious problem is raised by the question of whether the perceived risks that we infer are indeed representative of the perceptions that would prevail in the absence of any government involvement. A lender may adjust his perception of risk downward if he sees that the government is willing to assume a large potential liability exposed to the same risks. Also a lender expects that the government will defend his interests as well, even if he was not

officially insured. It is therefore possible that our measure of perceived risk is an underestimate.

#### COSTS AND BENEFITS

This Note attempts to estimate the social costs of the subsidies. We make no attempt at evaluating the benefits. We also abstract from indirect costs that are due to the reallocation of resources between export and other sectors.

Although the costs of such export subsidies fall directly on the taxpayers and consumers, it is less obvious how the benefits are partitioned between the domestic and the foreign importers. To answer this second question, we would need to know how effectively exports are increased through subsidies.[7] We can expect this effectiveness to differ from one commodity to another and from country to country. To address the question of how the benefits of such export subsidies are shared we would therefore need information, by commodity and country, of demand and supply elasticities. Such an extensive investigation was outside the scope of this preliminary project.

Our estimates of subsidies on West-East trade cannot be interpreted as estimates of resource flows. We would need to deduct the portion of the subsidies that accrue to domestic exporters, but we also abstract from the direct interest rate subsidies and concentrate only on the subsidy due to risk assumption by the government. To estimate the resource flow, we would add the two subsidy components to obtain the

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[7] This question of "additionality" is an ever-recurring theme in debates on export promotion. Depending on the speaker's particular interests, implicit estimates of the rate of additionality due to guarantees (dollars of additional exports per dollar guaranteed) range from zero to close to 100 percent (see, for example, the various reports by the Comptroller General of the United States cited in the references).

total subsidy and then determine how it is shared between exporters and importers.

The export credit and credit guarantee agencies of the major industrialized countries all operate according to a similar pattern. In the next section we give an overview of some of their most important features and introduce the necessary terminology.[8] We will also show how the risk premium is related to the measure of perceived risk. This allows us to determine the hypothetical interest rate that would be charged on a loan of a given riskiness. Subject to the provisos outlined above, it is this rate that importers would have to pay for loans in the absence of any government assumption of risks.

Section III concentrates on estimating the perceived probability of nonpayment and the salvage ratio, which are the major determinants of the risk premium that would be charged in a competitive market. However, we are unable to identify them separately from the available data, nor do we need to. The probability of nonpayment and the salvage ratio are probably determined jointly by the lenders evaluating the risks, and for our calculations we can confine our attention to the composite risk measure  $w = P(1 - s)$ .

The machinery developed in Secs. II and III is then applied to estimating the subsidies on exports to the Eastern Bloc in Sec. IV. We arrive at quite substantial figures for plausible values of the composite risk measure.

Throughout all this it has to be kept in mind that we confine our attention to subsidies due to the removal of the risk premium only. Additional subsidies, due to extending credits at rates less than the

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[8] For a more detailed description of the major systems, see the appendix.

rates for government securities, would have to be added to our estimates.

Export subsidies are usually justified on the basis that they increase exports--and therefore production, employment, and income--in the exporting country. In Sec. V we develop a simple model of the economy that lets us determine for which values of subsidy rates and export price elasticities this is indeed true. We find that for probable values of these parameters, export subsidies are likely to reduce welfare rather than increase it, even if they are instituted in retaliation to foreign subsidies. Some concluding thoughts follow in Sec. VI.

## II. EXPORT CREDIT FINANCING AND INSURANCE

Exports are only one type of foreign transaction that governments encourage by assuming part of the risks. Others not considered in this study include long-term investments in plants abroad, which are exposed to similar risks. In the United States, the Overseas Private Investment Corporation (OPIC), an agency of the federal government, sells low-cost insurance against such investment risks as expropriation and inconvertibility. Other governments presumably offer similar services to their companies that want to invest abroad. We also do not cover the variety of "compensation agreements" that the Soviet Union and some Eastern European countries conclude with foreign investors and exporters and that often also contain explicit or implicit risk protection by the government. We abstract from these transactions, and the subsidies that they might entail, and concentrate only on the programs intended to lower the costs of financing exports by transferring most of the default risks to the government, sometimes for a fee.

### TERMINOLOGY

Selling to foreign buyers on a credit basis can take place in several ways. The supplier may finance the transaction and then purchase insurance to cover losses on his accounts receivable, probably the most common protection against this type of export risk. If the supplier also obtains financing for the transaction from an official credit agency such as the EXIM Bank, it falls into the category of "supplier credits."

Recently an alternative way of financing export transactions has become widespread. The importer seeks a credit from a bank in the exporting country to make the purchase. The bank will usually approve the loan at a very low rate, if it can obtain for free or purchase at low cost a guarantee that its own government will reimburse the bank in the event of a default. This risk cover is in most systems termed a "guarantee" as opposed to an "insurance policy" issued to a supplier of exports.

In some instances, specialized banking establishments have been formed, such as the U.S. Private Export Funding Corporation (PEFCO). On the strength of an unconditional guarantee granted by the U.S. government through EXIM Bank, PEFCO is able to raise long-term funds at a very low interest rate (only about 50 points above the T-bill rate) and relend them at very low rates to foreign purchasers of American goods. If the government itself directly extends a loan to a foreign buyer of U.S. goods, it is called a "buyer's credit."

For large transactions, the different financing methods are frequently mixed. In some countries, such as France, foreign assistance loans at concessionary terms are often used to complement the financing packages and reduce the blended interest rate. The one thing that all these financing schemes have in common is that the governments assume part or all of the risks.

The risks involved in extending credit to foreign importers are usually divided into commercial and political risks. Commercial risks, until recently much more prevalent than political ones, cover such categories as default or bankruptcy by a private buyer in a foreign

country. Political risk covers all categories that are out of the control of a private buyer, such as expropriation, war, and inconvertibility.[1] The distinction between political and commercial risks is important for a number of reasons. First, insurance against commercial risks has traditionally been provided by private insurers for their own account. Today these private insurers may be reinsured by the government and may also be administering political risk insurance for the account of the government, but they are still directly liable for most of the commercial risk claims.[2] Second, the coinsurance requirements are usually lower for political than for commercial risk insurance. The EXIM Bank in the United States and the Export Credits Guarantee Department (ECGD) in the United Kingdom have no coinsurance requirement on the political risk insurance that they provide.[3]

Recently, a small but growing number of private insurance companies have begun to offer political risk insurance on their own account. Unlike the Foreign Credit Insurance Association (FCIA) and its counterparts in other countries, which act as agents for the official agencies, these companies are not affiliated with the government and reinsure themselves in the private market. They offer a wide range of political risk insurance policies that differ to varying degrees from

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[1] In some countries it also covers natural disasters such as floods and earthquakes. The rule of thumb is that commercial risks no longer exist when the payment has been made available in local currency.

[2] This is the prevalent system in the United States, France, and, to some extent, FRG. See appendix for details.

[3] If a lender is insured for 100 percent of his loss (no coinsurance), he has no incentive to prevent his borrower from defaulting. This is commonly known as "moral hazard," and insurance companies protect themselves against this possibility through "deductibles" and "coinsurance." Apparently, official agencies consider moral hazard to be very small for political risks.

the ones offered by the official agencies. For example, they typically run for three years, require 10 percent coinsurance, and have premiums negotiated case by case. In the United States we estimate that these private companies account for 30 to 50 percent of the value insured against political risks.

In centrally planned economies, distinctions between commercial and political risks become somewhat artificial. The usual practice is therefore to consider sales to public buyers to be exposed to political risks only. However, if a public buyer has separate budgetary authority, commercial defaults are still possible, at least theoretically.

#### THE COSTS OF LENDING TO RISKY BORROWERS

##### Accounting Costs

Here we consider accounting costs somewhat closely, if only because proponents of government guarantees frequently argue that they are nil and that extending guarantees on foreign credits "costs the taxpayers nothing." This argument is fallacious, even if accounting costs were zero.

At first glance many export credit and guarantee agencies do appear to be covering their budgetary costs. However, this is largely because of the accounting practices followed. EXIM Bank provides a good example of practices we believe are common to export credit agencies and loan guarantors in most noncommunist industrialized countries. EXIM's accounting practices also reveal factors that have affected credit and guarantee extensions by OECD members to communist nations.

Under these accounting procedures, bad loans and loans purchased pursuant to guarantee agreements are frequently credited to accounts

receivable at their face value. They are not discounted, as prudent business practice would dictate. Overdue interest is similarly added to accounts receivable on the assets side and to reserves on the liabilities side of the balance sheet.[4] In the past few years they have been the major source of additions to reserves.

Today the EXIM bank reports over \$2 billion in accumulated reserves. Closer scrutiny reveals that once we subtract the portion of reserves that are most unlikely to be readily available (e.g., overdue interest on delinquent loans), remaining reserves have actually declined over the past five years. If all overdue or rescheduled loans were written off, the EXIM bank reserves would be almost wiped out (see Table 1).

The most disturbing feature that Table 1 shows is the increasing proportion of EXIM Bank's loans that have gone bad and guarantees that had to be made good. The result is a substantial deterioration of the quality of EXIM Bank's assets. A similar analysis of other export credit agencies either in the United States or elsewhere in the noncommunist world would probably show the same pattern.

For obvious reasons, we have much more information available on the U.S. institutions (EXIM Bank, CCC, etc.) than on their counterparts in other OECD countries. As a consequence, many of our criticisms of export credit guarantee systems are illustrated with examples that refer to the United States. However, this choice should not be construed to

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[4] Nonaccountants may think it strange that reserves are considered a liability rather than an asset. Consider that the balance sheet partitions a firm's wealth in two ways. "Assets" are the forms in which wealth is held. "Liabilities" are claims (including ownership claims) on that wealth. As used here "reserves" are wealth that has no current claimant other than the firm's owners but that might legitimately be claimed by an insured party who suffers a loss.

Table 1

SOME INDICATORS OF THE FINANCIAL CONDITION OF EXIM BANK

Item	1981	1980	1979	1978	1977	1976	1975
Delinquent loans as percentage of loans receivable	5.6	5.3	5.2	4.1	2.8	2.6	1.1
Purchased loans as percentage of loans receivable	1.5	1.4	0.8	0.4	0.2	--	--
Delinquent interest as percentage of reserves <sup>a</sup>	7.8	7.5	3.4	2.3	1.9	1.8	1.1
Reserves as a percentage of loans receivable	13.9	15.9	17.5	16.9	16.0	15.9	16.4
Reserves as a percentage of "dubious" loans <sup>b</sup>	115.8	140.1	157.5	172.0	190.6	180.9	178.7
"Hard" reserves as a percentage of loans receivable <sup>c</sup>	12.7	14.4	16.2	16.0	15.1	15.0	15.5
"Hard" reserves as a percentage of "dubious" loans	104.4	127.0	145.9	162.9	180.0	171.0	169.1

SOURCE: EXIM Bank, various Annual Reports.

<sup>a</sup>Delinquent interest and interest on delinquent loans are credited to reserves as they accrue.

<sup>b</sup>"Dubious" loans are either purchased, rescheduled, or delinquent. From 1975 to 1981 the proportion of rescheduled loans has held steady around 5 percent of total loans receivable.

<sup>c</sup>"Hard" reserves exclude rescheduled or delinquent interest (see note a).

imply particular criticism of the U.S. agencies. We suspect that, had the corresponding information been available to us, similar and perhaps more blatant examples could have been cited for other countries.

Furthermore, the practices and policies of the official export credit insurance agencies in the United States are prescribed by Congress, and

our criticism, where applicable, is directed at the policymakers and not those executing the policies. When we had an opportunity to meet the individuals who carry out the U.S. government's policies in this area, we found them to be devoted, competent, and cooperative.

#### The Risk Premium

A risk-neutral lender will extend a loan to a risky borrower only if his expected return from the risky investment is at least equal to what he could earn from a risk-free investment of equal size. Because there is a nonzero probability that he might lose all or part of his risky investment, the expected return will be equal to that of the risk-free alternative only if the risky borrower pays an interest rate  $d$  larger than  $r$ , the rate of return on risk-free securities (e.g., Treasury bills). Without loss of generality we can define a risk premium  $\delta$  such that

$$(1 + d) = (1 + r)(1 + \delta) . \quad (1)$$

The expected value of a risky loan in the amount  $X$ ,  $t$  periods from now, depends on the risk premium ( $\delta$ ), the probability of a default occurring ( $P$ ), and the value of any possible salvage that can be recovered in case of a default. We can determine  $\delta$  by setting this equal to the corresponding value of a risk-free investment,[5]

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[5] For simplicity we assume that each loan has only one scheduled repayment of principal and interest. A loan with a series of repayments can be viewed as multitude of loans, each with only one repayment.

$$(1 - P)(1 + r)^t(1 + \delta)^tX + P\sigma = (1 + r)^tX . \quad (2)$$

The right-hand side of Eq. (2) is the (certain) value of a risk-free loan. The first term on the left-hand side is the repayment of  $X$  with interest  $[(1 + d)^tX = (1 + r)^t(1 + \delta)^tX]$ , which the lender expects to receive with probability  $(1 - P)$ , and the second term is the value of any salvage  $\sigma$ , which the lender expects to receive with probability  $P$ . In essence this is simply the probability-weighted sum of the only two outcomes possible: Either capital plus interest is received on time, or the investor receives whatever salvage he can realize. Salvage can represent the value of any assets that the lender might attach, or it could be the value of any future late repayments discounted to the time when the payment was originally due. Note that  $\sigma$  may be zero. If we divide Eq. (2) by  $(1 + \delta)^t(1 + r)^tX$  we get

$$(1 - P) + Ps = (1 + \delta)^{-t} , \quad (3)$$

where  $s$  is the ratio of the salvage value to the total payment due. We will refer to this ratio as the salvage ratio and it will always be between zero and one. Solving for  $(1 + \delta)$  we get

$$\begin{aligned} (1 + \delta) &= [1 - P(1 - s)]^{-1/t} \\ &\equiv [1 - w]^{-1/t} , \end{aligned} \quad (4)$$

where we have introduced our measure of risk  $w = P(1 - s)$ .

From Eq. (4) we can calculate  $\delta$  as a function of the probability of nonpayment ( $P$ ), the length of the loan ( $t$ ), and the expected salvage ratio ( $s$ ). Note that  $\delta$  is increasing in  $P$ , and that for a given  $P$ ,  $\delta$  is at its maximum when no salvage can be expected so that  $s = 0$ , and at its minimum ( $\delta = 0$ ) when  $s = 1$ --the expected salvage amounts to principal plus interest. This second limiting case is equivalent to stating that  $P = 0$ .

Of the parameters influencing  $\delta$ , only  $t$  is readily observed.  $P$  and  $s$  have fairly clear definitions, but their values depend on the investor's subjective risk assessment. To give an impression of the probable range of  $\delta$ , we have calculated it for various values for  $t$  and  $w$ . The results are given in Table 2.

These values for  $\delta$  imply substantial increases in interest rates that would be charged from risky borrowers. For example, a  $\delta$  of 1.0 implies that  $1 + d = 2(1 + r)$  (see Eq. (1)). At an  $r$  of 12 percent this translates into an interest rate  $d$  equal to 124 percent.

Table 2  
RISK PREMIUM ( $\delta$ ) AS A FUNCTION OF THE RISK ( $w$ )  
AND THE TERM OF THE LOAN ( $t$ )

$t =$ (in years)	$w =$				
	.01	.05	0.1	0.2	0.5
1	.0101	.0326	.1111	.2500	1.0000
3	.0034	.0172	.0357	.0772	.2600
5	.0020	.0103	.0213	.0456	.1487
10	.0010	.0051	.0106	.0260	.0718

Although it is readily understandable that  $\delta$  is increasing in  $w$ , it might at first be surprising that it should be decreasing in  $t$ . However, this phenomenon can be easily explained from our assumptions underlying the definition of  $w$ . In our derivation we have assumed a constant  $w$ . Differences in risk between short- and long-term loans would be expressed through differences in  $w$ . Different  $\delta$ s for different  $t$ s do not reflect any judgment regarding differential riskiness of short- versus long-term loans. Rather they reflect differences in the period during which the risk premium can be recouped. If one were to demand the same proportion of the outstanding balance as a risk premium every year for a long-term loan as for a short-term one, assuming both have the same  $w$ , one would collect a considerably larger risk premium in the first case, even though the probability of receiving payment is the same in both cases.[6]

Up to this point we have treated  $w$  as given. In the next section we will attempt to identify the variables that influence  $P$  and find ways of narrowing its range.

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[6] We might alternatively assume that in each period an event that might lead to a default would happen with probability  $P$ . We could then model the increasing riskiness of longer term loans. However, the  $P$ s in the different periods are unlikely to be independent.

### III. QUANTIFYING FOREIGN CREDIT RISKS

#### WHAT INFLUENCES THE MARKET'S ASSESSMENT OF RISK?

We interviewed several individuals charged with assessing the risks of international transactions. The following discussion is based primarily on the information obtained from private insurers of foreign investment and export risk, and the terminology is borrowed from that line of business. For example, the term "client company" refers to the insurance company's client--that is, the exporting firm.

The factors deemed to be the most important determinants of risk are, in order of importance:

1. The client company
2. The type of project or the *importing firm*
3. The foreign country involved
4. The type of insurance (private or public)

In the case of centrally planned economies, points 2 and 3 can often not be distinguished. In loans to Poland, for example, some banks had made carefully evaluated loans to specific projects. When difficulties arose, however, the assets from these projects were merged with all the other government holdings. As a result, these projects became insolvent as well, even though on their own they could have met their obligations.

Client-specific risks are regarded as most important. An established firm with a multitude of business ties to a specific country stands a much better chance of getting paid than a small company

entering the market for the first time. Established firms have developed procedures for dealing with payment difficulties; they usually are represented through local agents and can exert pressure if necessary. Indeed, people at the EXIM Bank admit that most of their claim cases involve companies entering the export business for the first time. However, official agencies such as CCC and the EXIM Bank may not adjust their rates to reflect these differences in risk, for obvious political and legal reasons.

The second most important aspect concerns characteristics of the project itself. Certain projects are politically much more sensitive and therefore stand a much larger risk of incurring losses. For example, a company supplying inputs into a large infrastructure project that is important to the country and is generally recognized and accepted as important stands a much better chance of being able to fulfill its contract and obtain its money, even in case of a regime change, than a company that is providing inputs for a pet project of the current party in power.

In the case of export sales to private foreign importers, the "project" is the commercial transaction between the exporter and importer, and the riskiness of the project stands in direct relation to the credit-worthiness of the foreign buyer. If the buyer is a foreign government, then risks can be subsumed under political risks (point 3).

The third most important characteristic involves country-specific or political risks. The EXIM Bank has abolished its differential pricing based on the credit-worthiness of different countries, which seems to indicate that this aspect is of less importance than the first two.[1] It had become obvious that there was very little correlation

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[1] However, recall that in the case of exports to centrally planned economies, where the importing government is the borrower,

between the EXIM Bank's losses by country and the classification of countries by credit-worthiness.[2]

But other things equal, the market does make distinctions between the relative risks associated with different countries. An otherwise identical project from the same company will be considered more risky if it is to go to Zaire rather than West Germany. The problem is that the EXIM Bank's portfolio does not contain enough "otherwise identical" projects to allow making such a distinction.

If we combine data from a large number of official export credit and guarantee agencies, some of the client- and project-specific risks would wash out. An individual agency probably has only a few policies insuring exports to any specific country, and the country-specific experience might be heavily influenced by a few defaults due to client or project-specific reasons.

The ranking that we constructed (see Table 3) is based on the following principle. Given that official export credit agencies charge a fixed rate for their insurance and guarantees, we would expect an inverse relationship between the market's assessment of a country's P and S and the proportion of imports to this country that are officially insured and guaranteed. Since this coverage is not free, an exporter would tend to be more likely to seek this coverage if he considered the importing country to be a poor credit risk and vice versa. In 1981, the fraction of imports that was officially supported[3] by export credits, guarantees, or insurance from OECD governments ranged from 1.9 percent

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commercial risks are subsumed under political risks, and political risks become much more important.

[2] Such a ranking is also awkward for reasons of foreign policy.

[3] Insured, guaranteed, and financed through government loans. Separate data are not available.

Table 3

RANKING OF NON-OECD COUNTRIES BY PROPORTION OF IMPORTS  
OFFICIALLY SUPPORTED BY EXPORTING OECD GOVERNMENTS

Countries Receiving Commitments from Three or More Exporters				Other Non-OECD Countries (in alphabetical order)
1. Syrian Arab Republic	28. Ghana	56. Senegal		Bangladesh
2. Malaysia	29. Dominican Republic	57. Honduras		Hungary
3. Chile	30. Sudan	58. Peoples Republic of China		Iran
4. Bolivia	31. Mexico	59. Cameroon		North Korea
5. El Salvador	32. Paraguay	60. Mauritania		Vietnam
6. Singapore	33. Greece	61. Tunisia		Zaire
7. Netherland Antilles	34. South Korea	62. Ecuador		
8. Jamaica	35. Kenya	63. Angola		
9. Sri Lanka	36. Nigeria	64. Egypt		
10. Bahrain	37. Kuwait	65. Guyana		
11. Panama	38. Libya	66. Qatar		
12. Pakistan	39. USSR	67. Tanzania		
13. Guatemala	40. Iraq	68. Mozambique		
14. Bulgaria	41. Indonesia	69. Burma		
15. Trinidad and Tobago	42. Yemen Arab Republic	70. Oman		
16. Uruguay	43. Saudi Arabia	71. Ivory Coast		
17. Bahamas	44. German Democratic Republic	72. Bermuda		
18. Venezuela	45. Peru	73. Guinea		
19. Romania	46. Yugoslavia	74. Uganda		
20. Czechoslovakia	47. India	75. Liberia		
21. Hong Kong	48. Togo	76. Algeria		
22. Colombia	49. Cuba	77. Niger		
23. Cyprus	50. Philippines	78. Jordan		
24. Thailand	51. Israel	79. Gabon		
25. Turkey	52. Zambia	80. Argentina		
26. United Arab Emirates	53. South Africa	81. Madagascar		
27. Costa Rica	54. Morocco	82. Benin		
	55. Brazil	83. Congo		
		84. Poland		

for Syria to 94.3 percent for Poland. We consider the relative ranking more important than the specific ratios, so we have omitted the latter from Table 2.

Some importing countries were not eligible for officially supported credits and guarantees in many OECD countries. For example, Hungary does not enjoy most favored nation status under U.S. law, and exports from the United States to Hungary therefore do not qualify for official support. Other countries fall into the ineligible category because they are simply very poor credit risks (e.g., North Korea, Zaire). Table 3 therefore includes only countries that received commitments from three or more OECD exporters and the remaining non-OECD countries are merely listed in alphabetical order.

A further important factor influencing P and s is the importer's perception of the consequences of a default. Most importers are well aware whether their supplier will be reimbursed by the government in case of nonpayment. This would tend to mitigate any potential retaliation by the exporter and make the importer less reluctant to stop paying.

Faced with a situation of insufficient funds for meeting all commitments, a borrower will allocate his resources so as to minimize any adverse effects on himself. A lender holding uninsured loans is more likely to initiate actions harmful to the borrower--such as severing trade relations, seizing assets, or blacklisting the borrower--than a lender who gets reimbursed by his government. As a consequence the borrower will first pay off lenders who are not officially insured.

It is next to costless to default on securities that are guaranteed by another government. Indeed, given that the lending government can be counted on to demand no more than its own marginal cost of funds, either in a formal rescheduling or informally by accumulating interest at this rate on the overdue payments, not paying off these loans may be a unique opportunity to obtain funds at a highly subsidized rate. We will attempt to estimate the extent of this subsidy in the section on reschedulings.

Potential adverse actions by the lending government are minimal. Practically the only measures these governments could take would be to deny new credits and guarantees. However, this is rarely done. Despite its obvious inability or unwillingness to make good on its commitments coming due that year, in 1981 Poland obtained more than \$3.7 billion in new officially supported and guaranteed credit commitments, almost \$3 billion in the rescheduling alone. Most countries that are heavily in arrears have been able to obtain new credits and guarantees, exceeding their arrears, usually from the very same countries to which they are defaulting. In 1981, the only countries that were unable to obtain new commitments exceeding their overdue payments by at least a factor of two were North Korea, Iran, Sudan, and Zaire. Most countries heavily in arrears obtained new commitments amounting to 5 to 10 times their nonpayments.

There are very strong incentives to pay uninsured investors before publicly insured ones. Indeed, some private companies are at present receiving payments from Poland. The CCC, however, is not even receiving the interest payments on the rescheduled debt.

There is reason to believe that privately insured lenders receive even more preferential treatment from borrowers than uninsured ones. To begin with, private insurance coverage is strictly confidential. Until a default occurs, the borrower may not know whether his lender is insured. Second, in case of a default, private insurance companies typically demand much more stringent efforts from their clients to collect than public ones do. For example, private insurers of political risks typically require 10 percent coinsurance, and official insurers require only 5 percent or no coinsurance at all. And third, private insurance companies are usually represented in the borrowing country either through agents or through joint venture agreements with local companies.[4] This gives them excellent opportunities to exert pressure when needed.

To sum up, we have identified several factors that influence the assessment of foreign credit and export risks. This analytic exercise helps us understand how P and s are determined but gives very little guidance on how they should be measured. In the subsequent sections we will attempt to find ways of measuring them from the available data. The different measures do not all lead to the same results, but they should allow us to determine some probable bounds on the value of these elusive parameters.

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[4] A private company insuring exports from the United States to Poland, for example, will often do so jointly with a Polish insurance company. In return, the two companies will also jointly insure trade flows going in the opposite direction.

### AN ACTUARIAL ESTIMATE OF RISK

At least in theory we can infer export credit risks from historical experience. What we need to do sounds simple: Divide the total defaults by total loans granted, if necessary, by country. In practice, however, this figure is almost impossible to obtain.

We do know the total balance of officially supported credits outstanding, and we even know how much of it is overdue. However, this figure (less than 2 percent) is quite meaningless for several reasons:

First, on the basis of the available data we cannot ascertain which portions of the outstanding loans have become due and have had any opportunity to be defaulted on. Many of the outstanding loans were granted quite recently and will not come due for quite a few years.

Second, based on the same data, we do not know how many loans have been repaid. The ratio  $P$  that we want to estimate, for example, is defined as the probability of nonpayment and could be estimated by the empirical frequency of nonpayments as a fraction of the sum of payments made on time plus payments not made. Although arrears are accumulated nonpayments and would serve at least as a first approximation, we have no data on payments made on time. Furthermore, this measure ignores any salvage.

Third, rarely are arrears left standing for long. The usual procedure is to reschedule a country's debts. In this manner, overdue payments are converted into future receipts and are no longer carried as being overdue.

There are additional concerns regarding an actuarial estimate of risk. It is most unlikely that external conditions have remained stable

over a sufficiently long time span. Especially if we wish to estimate country-specific risks, we are almost certainly at a loss. Although some countries that have defaulted on some payments are likely to default again, it is frequently just as likely that a country that has previously paid its debts on time will not default. In 1980, Poland had practically no arrears, and an actuarial estimator would have suggested that it was a good risk.

With the cooperation of official guarantee agencies it would certainly be possible to obtain better actuarial estimates of risk than we have at present. However, it would require information from more than just American agencies, and some of the other official agencies are often hesitant to provide detailed data on their operations. So rather than attempting to construct an actuarial estimate of risk from questionable data, we have attempted to infer its value as perceived by lenders from more readily available data, such as the rates charged for insured loans and the insurance premiums charged by private insurance companies.

This process does not disregard actuarial experience completely. The market's assessment of risk is based, at least in part, on past experience. Even if we could calculate precise actuarial estimates, we would not a priori know how to weigh them relative to other determinants of P and S such as debt service ratios or foreign reserves. In other words, we would need to determine how to balance an actuarial estimate, which is only backward looking, with possible evidence of future problems. In the private market, investors consciously or unconsciously make such a determination and reveal their implicit weighted estimates of risk in the rates they charge on uninsured loans or in the premiums competitive private insurance companies charge for assuming the risk.

# THE INTEREST RATE ON INSURED LOANS

Although we lack sufficient data to make reliable actuarial estimates of the probability of nonpayment and the salvage value of a missed payment, we can use the interest rate on an insured loan to infer the subjective values assigned to these two parameters by lenders. For a risk-neutral lender, the expected return on an insured loan must be equal to the return on a risk-free investment. Insured loans are not risk-free if there are coinsurance requirements, wherein the lender must bear some proportion of a loss himself.[5] If all losses are shared between lender and insurer in this fashion, then we have

$$(1 + d)^t [(1 - P)D + (X - D) + PsD] \\ = (1 + r)^t X + i(X - D)(1 + d)^t \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right], \quad (5)$$

where  $d$ ,  $P$ ,  $r$ ,  $s$ ,  $X$ , and  $t$  are defined as before:

$D$  = the uninsured portion of the principal

$i$  = an annual insurance premium expressed as a fraction of the insured principal and interest

$(1 + r)^t X$  = the return on a risk-free loan

$(1 - P)D$  = the expected timely repayment of uninsured principal

$(X - D)$  = insured principal

$PsD$  = expected salvage of uninsured principal accruing to lender. (Note, lender and insurer split salvage in the same proportion as losses.)

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[5] If there is no coinsurance requirement, the lender will charge  $d = r + i$  where  $i$  is the annual insurance premium. We can infer the risks only from the rate charged on insured loans with coinsurance requirements. Although the EXIM Bank requires no coinsurance, the CCC, some foreign insurers, and all private companies do. Our estimates are based on data from these types of loans.

$[(1 - P)D + (X - D) + PsD] =$  expected repayment of principal. The investor receives  $(X - D)$  with certainty (either from the borrower or from the insurer), and whether he receives  $D$  or only the fraction  $s$  of  $D$  depends on  $P$ . This term is multiplied by  $(1 + d)^t$  to reflect principal plus interest.

$i(X - D)(1 + d)^t =$  insurance premium to be paid at the beginning of each period.

$i(X - D)(1 + d)^t \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right] =$  total cost of purchasing the insurance (present value of the insurance premiums) brought forward at the risk-free interest rate to the time when repayment is scheduled.

We define  $I$  as the insured fraction of the loan and note that

$(X - D)/X = I$  and  $D/X = (1 - I)$ . Also in our construction, the

insurance covers the same fraction of principal and interest. Dividing

through by  $X(1 + d)^t$  and rearranging terms, we eliminate concern with

the actual amount loaned.

$$(1 - P)(1 - I) + I + Ps(1 - I) = \left[ \frac{1 + r}{1 + d} \right]^t + iI \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right]$$

or,

$$(1 - I)[1 - P(1 - s)] = \left[ \frac{1 + r}{1 + d} \right]^t + iI \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right] - I \quad (6)$$

Note that we have defined "perceived risk" ( $w$ ) as a two dimensional variable composed of "perceived probability of default" ( $P$ ) and "perceived salvage ratio" ( $s$ ) (i.e.,  $w = P(1 - s)$ ). Solving Eq. (6) for  $w$  we get:

$$w = - \left\{ \left[ \frac{1 + r}{1 + d} \right]^t + iI \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right] - 1 \right\} / (1 - I) \quad (7)$$

Equation (7) allows us to infer the risks implicitly assumed by

investors from data on the market for insured loans. For example, in

1979-80, CCC-insured loans to Poland were extended at rates  $d$  of

approximately 12.25 percent. At that time the T-bill rate was about 11.5 percent. CCC guarantees cover 98 percent of principal and 8 percentage points of interest, which averages out to coverage of about 89 percent of principal and interest, and runs for three years. CCC charges 33 points (.33 percent) of principal and interest for its coverage. Using Eq. (7) these figures imply a  $w$  of .081, which is consistent with the following combinations of  $s$  and  $P$ :

$s =$	.0	.1	.2	.5	.8
$P =$	.081	.090	.101	.162	.405

These numbers show that investors already felt in 1979-80 that there was more than an 8 percent chance that Poland would not repay its loans on time.[6] Implicit risk calculated in this manner refers to insured loans with coinsurance. In the absence of any data on (hypothetical) uninsured loans, we will use this measure as a proxy for risk. We realize, however, that lenders might perceive risks differently if the government was not involved at all.

The term  $w$  is not an objective measure, but rather reflects market perceptions. Gathering the necessary information to evaluate the different parameters is not costless. It is possible that the objectively evaluated risk might be different; however, lenders do not want to make this evaluation and may thus be more conservative in purchasing insurance coverage than the facts warrant. Furthermore,

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[6] In this table the first column corresponds to the scenario that Poland does not pay on time and the money is lost for good, and the last column represents not receiving the payment on time but being able to recover 80 percent of principal and interest later. If they are able to recover a large portion of their money at a later time, investors are willing to accept much higher values of  $P$ .

considerations of gambler's ruin--being exposed to a contingent liability that exceeds one's net worth--may lead to risk-averse behavior that would also tend to raise  $w$  estimated in this manner.

For the purpose of determining the subsidy implicit in government guarantees, the perceived risk ( $w$ ) is the relevant measure. It is this  $w$  that determines the risk premium that borrowers would have to pay if the government didn't guarantee the loans. Referring back to Sec. II, we note that for loans of three year terms a  $w$  of .081 would lead to a  $\delta$  of .029. At a risk-free interest rate of 11.5 percent (the T-bill rate in 1979-80), this would imply that a borrower like Poland, in the absence of official guarantees, would have had to pay at least 14.7 percent interest per year, considerably more than the 12.25 percent actually paid on CCC guaranteed loans.

More recently, private insurance companies have offered coverage for credits to Eastern Europe at a rate of approximately 90 to 110 points. These policies are bought mainly by private companies investing their own funds. Assuming their marginal cost of funds to be a little less than the prime rate, we can assume it to be about 1.75 percentage points above the risk-free interest rate. Going through the same calculations as above, we obtain a  $w$  of .119.

The weakness of this procedure for inferring the market's assessment of risk from data on insured loans is that we need very precise data on  $d$ . As would be expected, the calculated probabilities are very sensitive to small changes in  $d$ . Such data must exist, but it is not generally available to outsiders. The estimates that we have used have come to us second and third hand, and they probably are little more than rough guesses. Nevertheless, they allow us to bound from

below the market's assessment of risk in 1979-80 for Eastern Europe in general, and Poland in particular, at  $P(1 - s) = .08$ . This estimate has probably been increasing and was in all likelihood larger than .2 in winter 1982.

#### INSURANCE PREMIUMS CHARGED IN THE PRIVATE MARKET

Private insurance companies traditionally offered insurance against the commercial risks of exporting and investing abroad. Hermes, for example, is a private company, FCIA is a consortium of private companies. However, private insurers, especially in the United States, traditionally shied away from offering cover against political risk. This made it difficult to insure exports and credits to the Eastern bloc in the private market.

This is no longer the case. An increasing number of private insurance companies offer insurance against political as well as commercial risks. They thus complement and sometimes duplicate the services of the official export credit and guarantee agencies, often at lower costs.

The insurance policies offered by the private insurers differ in some respects from the ones offered by the official agencies. For example, private companies do not offer coverage against land-based war risks and only rarely guarantee coverage for more than three years. They feel that they cannot possibly assess the risks for longer times. Private insurers always require coinsurance, and they also vary their rates depending on how they assess the different components of the risk (see Sec. III). Unlike public insurance, private insurance policies are treated as strictly confidential, are available for anywhere in the world (at a price), and are usually tailored to the clients' specific

needs. Private insurers can thus provide innovative insurance policies, such as coverage for barter deals, coverage against cancellation of export licenses for political reasons (e.g., grain embargo), etc.

This flexibility of terms for private insurance coverage makes it difficult to ascertain what insurance premiums are. Table 4 has been constructed on the basis of a few discussions held with individuals in the private insurance business. The numbers are averages of what are at best rough guesses.

Private insurers view the Eastern bloc second in riskiness to the Middle East and more risky than Latin America, the Far East, and Africa. For insurance against such contingencies as "inconvertibility of payments," which make up the bulk of the "other" category, the Eastern bloc is regarded as 25 percent riskier than the next runner up (Middle

Table 4

TYPICAL INSURANCE PREMIUMS CHARGED BY PRIVATE INSURERS  
FOR POLITICAL RISK COVERAGE

Area	Expropriation	Type of Cover	
		Contract Repudiation (public buyers)	Other
Latin America	60	75	75
Middle East	125	125	100
Africa	80	85	85
Eastern Bloc	60	90	125
Far East	45	75	100

NOTES:

Rates in points (cents per \$100) per year.

Three year maximum policies.

5-10 percent coinsurance.

Excepting certain countries such as Iran, Iraq, North Korea, etc.

and Far East). The second column reveals that in the opinion of the people contacted, Eastern bloc governments are viewed as slightly less likely to satisfy the terms of a signed contract. Even African governments are viewed with more trust.

The figures in Table 4 are based on interviews conducted during the summer of 1982. They therefore reflect the Polish default. However, the Mexican international finance crisis was not yet upon us, so those effects are not reflected and would almost certainly lead to an upward adjustment of the quotes for Latin America.

To cover its costs, a private insurance company must collect premiums that are at least equal to its claim payments net of any potential salvage. At the same time, competition, not least of all from the publicly subsidized sector, would tend to erode any excess profits. Disregarding transaction costs, which are usually covered by up-front fees anyway, we can state that an insurance company will set  $i$  to equate

$$i(X - D)(1 + d)^t \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right] = P[(X - D)(1 + d)^t(1 - s)] \quad (9)$$

where  $(X - D)(1 + d)^t$  represents the amount of the guarantor's potential liability and the entire left-hand side is the value of the premium brought forward to payment due date (see Eq. (5)). The right-hand side is the insured payment less the share of any salvage that would go to the insurance carrier, weighted by the probability of having to honor the policy. Dividing by the potential liability we get:

$$P(1 - s) = i \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right] \quad (10)$$

If we know the premiums and the expected salvage proportions of a private insurer, we can infer the implicit P that may have led to this rate. A typical rate for contract repudiation coverage on exports to Eastern Europe and the Soviet Union would be around 90 points per year for three year policies. Combining this with the present T-bill rate of 11.5 percent, we obtain a w of .037, which is consistent with the following combinations of P and s:

s =	.0	.1	.2	.5	.8
P =	.037	.042	.047	.075	.187

These figures seem to imply that insurance companies perceive the risks of exporting and lending to the Eastern bloc as fairly low.[7] There are a few points that should be kept in mind, however. First, private insurance companies believe, and experience seems to support this belief, that they have a very good chance of being able to salvage a substantial portion of the liability in case of a default. They protect themselves for this purpose by entering joint venture agreements with many of the governmental insurance companies in the Eastern bloc. Second, the private insurance companies deal only with experienced exporters. They usually require a minimum premium payment that is considerably above the average premium collected by FCIA, CCC, and EXIM Bank. Inexperienced and small exporters can expect to have to pay

[7] If we also take into account profit margins it would be even lower.

considerably higher rates. Third, private insurance companies often offer political risk coverage only in conjunction with other covers. They also freely admit that, in their opinion, the rates understate the true risks. Some companies may even view political risk insurance as loss leaders.

#### OTHER WAYS OF INFERRING THE RISKS

Parallel to the foregoing efforts we have informally surveyed bankers, exporters, and government officials and asked them directly what rate foreign borrowers, especially in Eastern Europe, would have to pay if official guarantees were not available. The answers were not very satisfactory. The standard reply was that unsecured loans would simply not be available--the risk premium would be infinite. We were given the impression that lenders make a binary choice on risk; if they consider an investment too risky, they won't make it, regardless of the rate.

This may be true at the level of the individual credit officer, who is more concerned about allocating his loan quota to loans of as high a quality as possible than about maximizing his return, but it is probably not true for the banking community as a whole. However, the markets for less than top-grade securities are indeed small and less formally organized, and data are not always available. But these markets do exist, and risky borrowers can find funds, if sometimes at very high rates.

Another reason bankers do not make it a practice to assess risks and adjust rates accordingly is that very low-cost official guarantees are available. For what amounts to a nominal fee, borne by the client, banks can insure 90 percent or more of their risk. The remaining self-

insurance portion is marginal enough to be ignored.[8] Such a strategy can be justified through the savings in information costs.

In some instances, we were nevertheless able to obtain some indirect evidence about risk premiums. For example, the securities issued by the Private Export Funding Corporation (PEFCO) are unconditionally guaranteed by the EXIM Bank. They are therefore rated AAA+ and typically go at only about 50 points above the T-bill rate. We asked investment bankers for large institutional investors how high they believe they would have to place short-term PEFCO securities (one to three years) in the absence of the EXIM guarantee. Most felt that they would either not be marketable or else would have to be placed in the "junk bond market" at rates around 700 to 1000 points (7 to 10 percentage points) above T-bill. This implies a risk premium  $\delta$  of about .08, which is roughly consistent with a  $w$  of .08 to .2.

These rates are somewhat higher than the estimates we obtained in the previous section, for at least two reasons. First, our estimate of implicit risk is based on historical data, some of which dates from before the Polish crisis. Rates at present are probably substantially higher. Second, when evaluating the risks of losing a small share of his investment, an investor under the current system may consciously or unconsciously count on the government to help him retrieve his share. In other words, the investor may view even his self-insured portion to be "guaranteed" by the government and expects to be reimbursed for more than just the insured fraction in case of nonpayment. How justified are such hopes of a bailout is unclear, and we prefer to assume that investors do not count on it.

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[8] In the case of credits to the Eastern bloc, which are exposed to political risks only, the self-insurance portion is zero in many countries, most notably the United States, Great Britain, and Japan.

#### IV. THE SUBSIDY ON GUARANTEED LOANS

The subsidies to the borrower of a guaranteed loan can be broken down into two parts. First, the rate  $d$  charged on a guaranteed loan is between the risk-free rate  $r$  and the fully risk-adjusted rate  $d$ , and even including the insurance premium, the guaranteed loan is usually still cheaper than a nonguaranteed one would be. Second, given the practice of guarantee agencies of rescheduling overdue debts at the lending government's marginal cost of funds, a second very substantial subsidy goes to the borrower when he falls behind in his payments. In this section we try to find ways of estimating these subsidy elements, concentrating first on the interest differential between insured and noninsured loans.

##### THE SUBSIDY DUE TO THE REDUCED-RISK PREMIUMS

In Sec. III we derived the risk premium that a lender would charge in the absence of any insurance coverage or guarantee as

$$\begin{aligned}(1 + \delta) &= [1 - P(1 - s)]^{-1/t} \\ &= [1 - w]^{-1/t} .\end{aligned}\tag{11}$$

The interpretation of Eq. (11) is quite straightforward. If investors feel, for example, that there is a 50-50 chance that a three year loan will not be repaid on time and that if it is not, they will be able to salvage 50 percent of what they should receive-- $w = .25$ --they would demand risk premium  $1 + \delta = 1.1$ . At a risk-free interest rate of 11.5 percent they would thus charge 22.7 percent, a full 11.2 percentage

points more. Even if they are 90 percent sure that they will get paid on time and that if they do not, they will be able to salvage 80 percent of their capital and interest ( $w = .02$ ), they will still charge an interest rate  $d = 12.3$  percent, almost one percentage point above the risk-free rate.

If investors are able to take out insurance against nonpayment, they will be able to reduce these rates considerably. In Sec. IV we inferred the implicit risks from the observed interest rates on insured loans. We can, of course, reverse this procedure and calculate the interest rate that would be charged on insured loans as a function of  $w$  and the insurance premium  $i$ . Starting from Eq. (7), we can solve for  $(1 + d)^t$ :

$$w(1 - I) = 1 - \left[ \frac{1 + r}{1 + d} \right]^t - iI \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right] \quad (12)$$

$$1 - w(1 - I) - iI \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right] = \left[ \frac{1 + r}{1 + d} \right]^t$$

$$(1 + d)^t = \frac{(1 + r)^t}{1 - w(1 - I) - iI \left[ \frac{(1 + r)^{t+1} - (1 + r)}{r} \right]} \quad (13)$$

The annual interest rate  $d$  charged on insured loans is simply the  $t$ th root of Eq. (13) less one. This derivation already takes the purchase cost of the insurance into account. The rate  $d$  is the total rate charged, with the insurance cost capitalized into the loan.

Assuming  $I = .89$ ,  $t = 3$  and  $i = .0033$ , the terms of CCC loans, along with  $r = .115$  (11.5 percent), we can calculate  $d$  as a function of  $w$  as in the previous example. With  $w = .25$  we get  $d = 12.9$  percent

rather than 22.7 percent in the absence of insurance. For a country with a  $w$  of .02,  $d$  turns out to be 12.0 percent rather than 12.3 percent in the absence of CCC guarantees.[1] The private market charges higher insurance premiums. Assuming the same parameters as above but fixing the insurance premium at 100 points per year, we find that the subsidies are smaller and are even negative for countries with a very low  $w$ . At  $w = .25$ ,  $d$  is equal to 13.8 percent, and at  $w = .02$ ,  $d$  is equal to 12.86 percent. This is consistent with our earlier finding that the typical premiums charged by private insurers imply a low  $w$ . If private companies fear that the probability of default on a specific loan is high they would, of course, raise the premium  $i$ .

In Table 5 we have calculated the different interest rates that would be charged in competitive financial markets for uninsured and insured loans of varying riskiness. We have chosen as an illustration three-year loans similar to those offered by the CCC. Recall that political risk insurance on EXIM Bank loans does not require coinsurance, so that the competitive interest rate on EXIM Bank guaranteed loans would amount simply to  $d = r + i$ .

#### THE ANNUAL SUBSIDY TO THE COMMUNIST BLOC

In Table 6 we have listed the total officially supported debt owed by communist countries to the West as of December 31, 1981. This includes loans extended directly by the OECD governments as well as loans extended by private banks but guaranteed or insured by the government.[2] We would like to know how big the subsidy is on this

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[1] This, incidently, also illustrates how much more poor credit risk countries profit from official guarantees than do good credit risk countries.

[2] Separate data are not available.

Table 5

ANNUAL INTEREST RATE ON THREE YEAR LOANS OF VARYING RISKINESS  
(Interest rate  $d$  in percent, assuming  $r = 11.5$  percent)

Type of Loan	Implicit Risk ( $w$ )				
	.01	.05	.1	.2	.5
Uninsured	11.62	13.42	15.49	20.11	40.48
Privately insured <sup>a</sup>	12.82	12.98	13.17	13.57	14.80
Officially insured <sup>b</sup>	11.95	12.12	12.33	12.75	14.07

<sup>a</sup> Assuming  $I = .9$ ,  $i = .01$ .

<sup>b</sup> CCC type of loan ( $I = .89$ ,  $i = .0033$ ).

outstanding balance that is due to the assumption of default risks by OECD governments.

We want to abstract from the interest rate subsidies on official direct loans extended at below market rates. We assume, therefore, that the interest rate charged on direct loans is at least equal to  $r$ . We also assume that the OECD governments charge an insurance premium  $i$  on all loans, direct official ones as well as private loans guaranteed by them.[3] We have chosen  $i = .005$ , which is the rate charged by EXIM Bank and seems to be typical for most official political risk guarantees. Because we are concerned only with centrally planned economies, we can disregard commercial risks.

[3] If the OECD governments do not charge a guarantee fee on the loans they extend directly, as appears to be the case, this assumption will tend to bias our estimates of subsidies slightly downward.

Table 6

ANNUAL SUBSIDIES ON TRADE WITH THE COMMUNIST WORLD DUE TO THE  
ASSUMPTION OF RISK BY THE EXPORTING GOVERNMENTS  
(In million U.S. dollars)

Assumed Risk (w)		.05	0.1	0.2	0.5
Uninsured Interest Rate		12.65	13.87	16.59	28.05
Insured Interest Rate		12.32	12.37	12.49	12.85

Borrowing County	Credits Outstanding as of 12/31/81	Subsidy Due to Interest Differential			
Bulgaria	436	1.44	6.54	17.88	66.40
Czechoslovakia	1,142	3.77	17.13	46.82	173.93
East Germany	3,603	11.89	54.05	147.72	548.74
Hungary	245	0.81	3.68	10.05	37.31
Poland	16,730	55.21	250.95	685.93	2547.98
Romania	2,691	8.88	40.37	110.33	409.84
Eastern Europe total	24,846	81.99	372.69	1018.69	3784.05
USSR	17,522	57.82	262.83	718.40	2668.60
Cuba	1,159	3.82	17.39	47.52	176.52
Vietnam	372	1.23	5.58	15.25	56.66
USSR and allies total	43,899	144.86	658.49	1799.86	6685.83
North Korea	552	1.82	8.28	22.63	48.07
China (PRC)	9,975	32.92	199.63	408.98	1519.19
Yugoslavia	6,857	22.63	102.86	281.14	1044.32
Total	61,283	202.23	919.25	2512.60	9333.41

NOTE: Assuming  $r = 11.5$ ,  $i = .005$ ,  $I = .95$ ,  $t = 5$  years.

Some official guarantee systems charge no coinsurance at all, while others charge up to 10 percent. We assume that coinsurance requirements on political risks are about 5 percent on average ( $I = .95$ ). We also assume that the average term of the loans is five years, which seems to be about correct.

With these assumptions we can calculate the subsidies accruing to the different communist countries. To do this we calculate the rate these borrowers would have to pay for different values of  $w$ , assuming an average  $r = 11.5$  percent, and compare it with the rate they would pay if their loans were insured by the lending governments according to the conditions listed above. The difference between these two interest rates, multiplied by the outstanding balance, gives the annual subsidy due to the official guarantees.

In Sec. III we had estimated  $w$  on the basis of the interest rates charged for insured loans and found it to be approximately .1. This estimate was based on market perceptions before the Polish default. Together with additional evidence we thus concluded that this figure was likely to be an underestimate and that  $w = .2$  was more probable.[4] Based on this figure, risk assumption by the exporting governments, even if done for a fee, amounts to a subsidy of around \$2.5 billion per year. At a  $w$  of .3, the subsidy would amount to \$4.3 billion, just about the entire civilian foreign aid budget of the United States.

#### THE SUBSIDY ELEMENT OF A RESCHEDULING

Outright defaults by foreign debtor countries are rare. If a foreign borrower country cannot meet its payments, it applies for a rescheduling of its debt. Under such an agreement, the payments coming due at a specific time are rescheduled to come due at some time in the future. The interest rate to be paid in the meantime is open to

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[4] This is closer to the often heard perception that "there is a 50-50 chance that Poland will pay on time and if not we'll be able to salvage 50 percent of our loans." The  $w$  implicit in this statement is .25.

negotiation; however, it is usually set at the borrowing costs of the lending government, usually far below the market rate that a debtor country, which is already in arrears, would have to pay. By continuing to pledge its full faith and credit and to borrow on the debtor's behalf, the creditor government thus subsidizes the debtor. The extent of this subsidy can be considerable.

Instead of receiving a payment  $X$  now, the lender government agrees to accept  $k$  years later a payment in the amount of  $X(1 + r)^k$ , where  $r$  is the government's cost of money (the T-bill rate). Assuming for the moment that the rescheduled payment will indeed be paid on time, which is by no means certain, what is the subsidy implicit in this arrangement?

If the debtor country had to borrow in the market, it would have to pay a risk premium, and its fully risk-adjusted borrowing rate would be  $(1 + r)(1 + \delta)$  where  $\delta$  is the risk premium. If it borrowed in the market to pay  $X$  now, it would have to repay  $X(1 + r)^k(1 + \delta)^k$ ,  $k$  years from now. The rescheduled payment as a fraction of what it is worth to the debtor country ( $R$ ) is thus[5]

$$\begin{aligned} R &= [X(1 + r)^k] / X(1 + r)^k(1 + \delta)^k \\ &= (1 + \delta)^{-k} \\ &= (1 - w) \end{aligned} \tag{14}$$

As an example, consider the Polish rescheduling of 1981. Of the officially guaranteed debt coming due in the first seven months of 1981 90 percent has been rescheduled at the official agencies' cost of funds.

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[5] Note that  $R$  is the special case of the salvage ratio  $s$ , where salvage is realized through a rescheduling.

Other terms of the agreement include a four-year grace period and the repayments spread over four years. Of the \$420 million due to the United States during this period, \$381 million have been rescheduled and will be paid on average six years later than originally scheduled ( $k = 6$ ). Overall \$2.9 billion were rescheduled at similar terms.

The risk premium  $(1 + \delta)$  that Poland would have had to pay in the absence of rescheduling depends on how risky the market would have considered six years' investments in Poland. Using Eq. (11) we can calculate  $(1 + \delta)$  for different values of  $w$ . This allows us to calculate the subsidy on this rescheduling from the United States and overall. The results are listed in Table 7.

Most bankers and most experts on international finance in and out of government feel that there is no more than a 50-50 chance that Poland will repay the rescheduled debt on time and that  $s$  is about .5. This best case ( $w = .25$ ) implies that Poland would have had to pay a risk premium of  $\delta = .05$  for six-year loans. Its borrowing rate would probably be in excess of 17 percent:  $(1.05 \times 1.115 = 1.171)$ . Measured

Table 7  
SUBSIDY IMPLICIT IN THE POLISH DEBT RESCHEDULING OF 1981

Item	Perceived Risk $w$		
	.1	.25	.5
Risk premium $(1 + \delta)$	1.018	1.059	1.122
Subsidy from U.S. (\$ million)	38.10	95.25	190.5
Subsidy from all OECD (\$ million)	290.00	725.00	1450.00

against this standard, the total subsidy granted to Poland in the 1981 rescheduling alone amounts to almost three-quarters of a billion dollars. This is in addition to the annual subsidies granted through the reduced risk premiums on the original borrowing rate (see above). The rescheduling of additional liabilities coming due in 1982 and later will almost certainly add similar amounts to the total subsidies.

## V. ARE EXPORT SUBSIDIES IN OUR INTEREST?

In the previous sections we established that guarantees and official insurance on foreign credits embody subsidies that may be substantial. In this section we make a first attempt at analyzing whether such subsidies are in the interest of the United States (or, for that matter, any exporting country). We abstract from the specific form in which the subsidy is granted and concentrate instead on the effects of a subsidy, in whatever form, on the economy.

In the standard model of foreign trade[1] it is easy to show that export subsidies, unlike import tariffs, always reduce the exporting country's welfare. By "taxing"[2] its citizens and subsidizing products bought by foreigners, the government reduces the domestic consumer's opportunity set. The reason for this net reduction in wealth is that resources that otherwise would produce output for domestic consumption are engaged in producing export goods, thus reducing goods available at home.

Proponents of export subsidies, however, argue that this model is inappropriate. First they claim that resources, particularly workers, that are producing exports are not drawn from domestic production and would be unemployed if they could not produce export goods. Second, exports have a multiplier effect similar to government spending, and

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[1] See, for example, Caves and Jones (1981), Chapter 11.

[2] In the case of credit guarantees this tax is indirect in the form of increased interest charges for domestic credit, which has become scarcer because of the competition from foreign borrowers. Because of the government guarantees, foreign borrowers gain preferential access to the credit markets.

third, we are forced to subsidize our exports to meet competition from other foreign countries, such as France.

The model presented in the next subsection takes these points into account. As we shall see, it is possible in such a model that export subsidies increase the exporting country's welfare, but only in special circumstances. These circumstances may hold for a few countries, but it is unlikely that they hold for all the Western countries that subsidize exports.[3] We have to conclude, therefore, that export subsidization can almost certainly not be defended on general welfare grounds, and continued adherence to such policies is probably due to special interest politics.

#### THE MODEL

Consider a simplified model of the U.S. economy with only two goods, export goods  $X$  and consumption  $C$ . National income is the sum of all the goods produced, and we have by definition:

$$Y = Xp_{us}^* + C, \quad (15)$$

where  $p_{us}^*$  is the production cost of U.S. export goods. Consumption goods are taken as the numeraire.

The demand for exports from the United States is a function of the price of U.S. exports (including financing) relative to the world price. In logarithmic form we have

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[3] But in cases where export subsidies are beneficial, there are usually also other alternatives available that yield similar or larger benefits at lower costs. We do not investigate these alternatives here.

$$\ln X = b(\ln p_{us} - \ln p_w) , \quad (16)$$

where  $b$  is the elasticity of demand for U.S. exports. This model assumes that the importers have a perfectly inelastic demand for imports overall. If U.S. and world prices increase in the same proportion, demand for U.S. exports as well as export demand overall remains unchanged. This assumption is probably a valid approximation for the importing countries of the Eastern bloc, which have to rely on the West for many high technology items. The parameter  $b$  is thus the price elasticity of the derived demand for U.S. exports.

The prices in Eq. (16) include the subsidies:

$$p_{us} = p_{us}^* (1 - \Pi_{us}) \quad (17)$$

$$p_w = p_w^* (1 - \Pi_w) , \quad (18)$$

where  $p_w$  refers to the production costs in the rest of the world and the  $\Pi$ s represent the subsidy rates, which we assume to be exogenous.

In this simple model, the welfare of the U.S. consumers is measured by their consumption. Net consumption is total income from production ( $Y$ ) less any taxes paid to subsidize exports. Such "taxes" may be indirect, such as higher credit costs due to the increased demand by foreign buyers. We abstract from additional welfare losses in the form of increased prices. If increases in exports are not matched by changes

in imports, prices will rise because the increased money income faces a reduced availability of goods not matched by inflows. We have consumption as

$$C = a(Y - \Pi_{us} p_{us}^* X) \quad (19)$$

where  $a$  is the marginal propensity to consume. The second term in parentheses is the total costs of the subsidies. We now have a complete model of five equations in five unknowns ( $Y, X, C, p_{us}, p_w$ ) and two exogenous variables  $\Pi_{us}$  and  $\Pi_w$ . Production costs are fixed. After differentiating totally we can write the system as

$$dY = dX p_{us}^* + dC \quad (20)$$

$$dC = a(dY - d\Pi_{us} p_{us}^* X - \Pi_{us} p_{us}^* dX) \quad (21)$$

$$\frac{1}{X} dX = b \left( \frac{1}{p_{us}} dp_{us} - \frac{1}{p_w} dp_w \right) \quad (22)$$

$$dp_{us} = -d\Pi_{us} p_{us}^* \quad (23)$$

$$dp_w = -d\Pi_w p_w^* \quad (24)$$

The model that we have developed here takes criticism of the traditional models into account. There are no resource costs to increasing exports, only to increasing the subsidies. There is a multiplier effect due to increases in  $X$  equal to  $p_{us}^* (1 - \pi_{us} a) / (1 - a)$ . If we pick the units of measurement such as to make  $p_{us}^*$  equal to one, this multiplier is larger than one. If there are no subsidies ( $\pi_{us} = 0$ ) then we have the traditional Keynesian export multiplier  $1/(1 - a)$ . As a corollary we also see that reduced exports (e.g., due to increased competition from subsidized exports of other Western countries) will lead to a reduction in  $Y$  and  $C$ . This observation leads proponents of export subsidies to conclude that we have to respond in kind to the subsidization of exports by our competitors.

We take the costs of subsidizing exports into account below and investigate the effects of changes in the subsidy rates.

#### CHANGES IN THE SUBSIDY RATES

To evaluate the effect of changes in the different subsidy rates on  $C$ , we solve the system (Eqs. (20) - (24)) and express  $C$  as a function of  $d\pi_{us}$  and  $d\pi_w$ . Substituting Eq. (20) into Eq. (21) and Eqs. (23) and (24) into Eq. (22) results in

$$dC = \frac{a}{(1 - a)} p_{us}^* [(1 - \pi_{us}) dX - X d\pi_{us}] \quad (25)$$

$$dX = - bX \left[ \frac{p_{us}^*}{p_{us}} d\pi_{us} - \frac{p_w^*}{p_w} d\pi_w \right] \quad (26)$$

We can replace the price ratios in Eq. (26) by  $(1 - \pi_{us})^{-1}$  and  $(1 - \pi_w)^{-1}$  respectively (see Eqs. (17) and (18)). Then after substituting Eq. (26) into Eq. (25) we get

$$dC = \frac{a}{(1-a)} p_{us}^* X \left[ - (1+b) d\pi_{us} + \frac{(1-\pi_{us})}{(1-\pi_w)} b d\pi_w \right]. \quad (27)$$

Consider the effect of a change in  $\pi_{us}$  on C, holding  $\pi_w$  constant. Setting  $d\pi_w = 0$  and solving Eq. (27) we get

$$\frac{dC}{d\pi_{us}} = \frac{a}{(1-a)} p_{us}^* X [ - (1+b) ]. \quad (28)$$

The marginal propensity to consume (a) is positive but smaller than one. The elasticity of the demand for U.S. exports (b) is negative but unless it is smaller than -1, expression (28) as a whole is negative. In other words, unless the demand for our exports is elastic ( $b < -1$ ), an increase in the subsidy rates on U.S. exports will reduce C, making U.S. consumers worse off. A reduction in  $\pi_{us}$  will make consumers better off.

Consider the change in C, when foreign governments increase their subsidy rates and we do nothing. The effects on C under these circumstances are evaluated by setting  $d\pi_{us} = 0$  and solving Eq. (27):

$$\frac{dC}{d\pi_w} = \frac{a}{(1-a)} p_{us}^* X \frac{(1-\pi_{us})}{(1-\pi_w)} b. \quad (29)$$

This expression is always negative, indicating that we are hurt by subsidies accorded by foreign governments on their exports.

This is not surprising. The way we have structured the problem, exports go to a third area not explicitly represented in this model (e.g., the Eastern bloc). Unless this area's derived demand for our exports is perfectly inelastic, ( $b = 0$ ), then an increase in subsidies on the exports of the rest of the world (e.g., Western Europe) will direct sales away from U.S. producers.

It is the explicit policy of the U.S. government to respond to increases in subsidy rates of our export competitors by a matching increase in U.S. subsidy rates. To evaluate the effects of such an increase and equivalent change in  $\pi_{us}$  and  $\pi_w$ , we set  $d\pi_{us} = d\pi_w = d\pi$  and solve Eq. (27) as

$$\frac{dC}{d\pi} = \frac{a}{(1-a)} p_{us}^* X \left[ \frac{(1 - \pi_{us})}{(1 - \pi_w)} b - (1 + b) \right]. \quad (30)$$

This expression, not surprisingly, is equal to the sum of Eq. (28) and Eq. (29). Unless Eq. (28) is positive and larger than Eq. (29) in absolute value, a very unlikely set of circumstances, Eq. (30) will be negative. This implies that a parallel increase in subsidy rates in the United States and abroad will make U.S. consumers worse off, and a parallel decrease will improve their welfare. This is the logic underlying the present multilateral negotiations in the Berne Union aimed at reducing export subsidies.

Faced with the policy question of how to respond to a unilateral increase in  $\Pi_w$ , we have to choose between two options. If we do nothing, our losses amount to Eq. (29); if we respond by an equivalent increase in  $\Pi_{us}$ , our losses (or gains) are given by Eq. (30). Because the difference between these two expressions corresponds to Eq. (28), we can improve our position if, and only if, Eq. (28) is positive. But in these circumstances, export subsidies would be in our interest regardless of what our export competitors are doing.

This raises some serious questions about the usefulness of the policies followed by the U.S. government. If the price elasticity of the derived demand for U.S. exports is between -1 and zero, as seems reasonable, subsidies on our exports are not in the interest of U.S. consumers. An announced policy of "matching foreign subsidies" is an empty threat if our competitors also believe that the U.S. government will act in the best interest of the U.S. economy. In the event of an increase in  $\Pi_w$  we can only increase our losses further by a matching increase in  $\Pi_{us}$ . Unless we can convince our competitors that in case of their increasing the subsidies we would take actions that run counter to our own interest in order to punish them, or that our actions will be dictated by the export industry rather than by all consumers, they will not be deterred from increasing their subsidies.

The "war chest bills"[4] are an attempt at making such a threat credible. By legally binding the U.S. government to automatically match

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[4] The war chest bills were discussed in both houses of Congress. Congressman S. Neal (D), North Carolina, introduced HR. 3228, which would provide for the accumulation of a fund out of which the U.S. government would subsidize exports to meet foreign subsidized competition.

foreign subsidy increases, even if it is not in the interest of U.S. consumers, it attempts to convince our competitors that we mean business. To be fully effective, however, such a bill would need to be irrevocable, which raises an entire host of new questions regarding the proper role of government in economic policymaking.

The story does not end here. Our competitors have options of making strategic moves themselves (e.g., war chest bills of their own). A negotiated multilateral reduction in export subsidies is certainly preferable to such posturing and threats of economic warfare.

But to convince all the participants of the sanity of negotiated multilateral subsidy reductions, we have to be able to quantify the total costs of such subsidies. Up to now, only the direct interest rate subsidies have been considered in this context. However, the only known report that quantifies these figures, the "Wallen Report" by the OECD secretariat, is highly confidential and we were unable to obtain a copy. The export industries, however, have successfully convinced the governments that export subsidies do increase foreign sales, implicitly arguing that  $b < -1$ , and that they are therefore in our interest.

## VI. CONCLUSIONS

Government assumption of credit risks transfers substantial subsidies to exporters and their clients. If we make the conservative assumption that  $P(1 - s) = .1$  for a typical five year loan, this would lead to a risk premium  $(1 + \delta)$  of about 1.021. The average term of officially supported export credits is about five years, and the balance at the end of 1981 was \$263.9 billion. At a risk-free interest rate of around 11.5 percent these figures imply an annual subsidy of more than \$6 billion, which would have to be added to the OECD secretariat's estimates of the costs of the interest rate subsidies.[1]

A large portion of this subsidy goes to trade with the communist world. As of December 1981 they had an outstanding balance of officially supported credits from the West of over \$60 billion, of which about \$44 billion was owed by the Soviet Union and its direct allies. Depending on the premiums charged for official guarantees as well as on the market's assessment of the risks, the total annual subsidy on these credits is probably around \$2.5 billion--of which \$1.8 billion goes to trade with the Soviet Union and its direct allies (see Table 6).

These numbers represent net subsidies based on assumed values of  $P$  and  $s$  or the composite measure  $w$ . Some countries--e.g., Poland--would have a higher  $w$  in the open market than the average, indicating that they receive an overproportional share of these subsidies.

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[1] Recall that  $1 + d = (1 + \delta)(1 + r)$ . Therefore, the rate of subsidy is  $d - r = .0234$ , which, multiplied by the outstanding balance, leads to an estimated subsidy of \$6 billion.

The numbers are necessarily crude and should be considered rough approximations. Lack of available data makes obtaining more precise estimates difficult. However, for reasonable ranges of the assumed parameters they are good approximations.

Some refinements should be possible without too much effort. Analyzing information about individual loans should take us a long way toward more reliable estimates. For example, it should not be too difficult to obtain better estimates of the salvage ratio  $s$  by investigating what proportion of overdue accounts was paid off within what time-frame.[2] This would also allow us to narrow down our estimates of  $P$  and thus  $w$ .

Whether subsidizing exports is in our interest is a contentious issue. We have made a few steps toward developing a basis for the debate. The model we developed in Sec. V is certainly an oversimplification. To make it a more useful tool we would need to take our export competitors explicitly into account.

This opens an area of research that we have barely touched upon. Efforts are currently underway to find agreements with the other major exporters to reduce export subsidies. If all competitors simultaneously subsidize exports by the same amount, none is able to direct substantially more business toward himself. The main beneficiary of such competition must be the importing countries. However, defenders of export subsidies firmly believe that the domestic export industry is the prime beneficiary. Whether this is indeed the case depends, among other

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[2] What little data are published by official insurance and guarantee agencies are in the form of yearly totals, with claim payments and recoveries netted out. It is not possible to link recoveries to claims from these data.

things, on the elasticities of export demand and import supply, and on whether other export competitors also subsidize their exports. The latter is true and tends to diminish the effectiveness of any export subsidies. The former can be answered only by analyzing the empirical evidence.

The major exporting governments have realized that the present system seems to favor the importers and have attempted to negotiate simultaneous reductions in subsidies to exports for some time. The results have been meagre. The so-called "gentlemen's agreements" offer many loopholes. Indeed, they offer strong incentives for all participants to subvert the agreements. But with improved understanding on how the export credit subsidies work it might be possible to structure agreements that are easier to enforce and offer stronger incentives to supplier governments to abstain from subsidizing export credits.

We have pointed out that additional costs are borne by society through the assumption of the export risks by governments. The sum of these components is still an underestimate for it ignores indirect resource costs (economists call them "deadweight losses") caused when one sector, exports, is subsidized to the detriment of another, for example, consumption or investment. But we have also not taken into account any indirect benefits that might come from increased exports and trade (e.g., political benefits). These indirect costs and benefits, especially trade, are very difficult to quantify and we doubt whether they would very much alter many of our conclusions.

The results of this research bring us a step closer toward evaluating the net resource flows from West to East. We have developed

a methodology that allows us to measure the total subsidy implicit in the governments' assumption of exports and foreign credit risks. We have applied some of these techniques to the West-East trade and found that probably there are substantial subsidies. However, our estimates of total subsidies are hampered by incomplete knowledge about the practices of other OECD countries, the different prevailing rates and premiums, basic data on credit volumes and terms. Furthermore, we are unable to isolate the portion of the subsidy that accrues to the importers. We suspect, however, that in the case of the Eastern bloc, demand for imports from the West is quite inelastic and that they are thus able to appropriate a very large portion of the total subsidy on West-East trade.

Appendix

COMPARISON OF THE DIFFERENT EXPORT  
CREDIT GUARANTEE SYSTEMS

Table A.1 displays and compares some of the major characteristics of the export-credit-cover programs of the five biggest exporting members of the OECD. Where the terms of cover vary by type of export and length of contract, the table shows the terms for the export of capital goods with a repayment period exceeding five years. Premiums, coinsurance requirements, and the sensitivity of premiums to the riskiness of the contract vary considerably.

The United Kingdom has perhaps the simplest system. Cover in that nation is offered by the ECGD (Export Credits Guarantee Department), a department of the government. Cover for long-term contracts for the sale of capital goods is unconditional. The premium charged depends on the length of contract and the riskiness rating of the importing country. (Representative premium rates were not available to us but would be useful to acquire.) For shorter term contracts, coinsurance of up to 10 percent is required. If the loss is due to refusal to accept goods, the exporter must bear at least 28 percent of the loss.

In France export credit cover is offered by COFACE (Compagnie Française d'Assurance pour le Commerce Extérieur, the French foreign trade insurance company). COFACE is a para-public<sup>[1]</sup> corporation that extends short-term cover on its own account and long-term cover on behalf of the French government. Coinsurance requirements vary from 5

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[1] We understand that French "para-public" corporations have the legal status of private corporations but are wholly owned by the government.

Table A.1  
OVERVIEW OF THE DIFFERENT INSURANCE AND GUARANTEE SYSTEMS  
(Premiums expressed in points per year; 1 point = .01% of insured value)

Country	Political Risk Insurance			Commercial Risk Insurance			Other Coverage Available
	Provider	Coverage (%)	Premiums	Provider	Coverage (%)	Premiums	
France	COFACE	95	25 <sup>a</sup>	COFACE	95	85 <sup>a, b</sup>	Exchange Risk <sup>c</sup> Cost Escalation Risk Bond Insurance Standard
FRG	Hermes/ <sup>d</sup> Treuarbeit	90	150 flat <sup>b</sup> + 10/mo.	Hermes/ Treuarbeit	85	150 flat <sup>e</sup> + \$10/mo.	Exchange Risk <sup>c</sup> Bond Insurance Standard
Japan	EID/MITI	95	10-300	EID/MITI	95	10-300	Exchange Risk <sup>d</sup> Bond Insurance Standard
U.K.	ECGD	100	Set case by case	ECGD	100	Set case by case	Cost Escalation Bond Insurance Standard
U.S.	EXIM Bank	100	50.125	FCIA <sup>c</sup>	90	50-350	None

<sup>a</sup> A risk premium, which must be factored into the contract price, is added case by case.

<sup>b</sup> Only combined political and commercial risk policies available.

<sup>c</sup> Exchange risk policies in France, Germany, and Japan are reciprocal--e.g., in Germany, exchange losses in excess of 3 percent may be fully insured, but if they are, then exchange gains in excess of 3 percent must be surrendered to the government.

<sup>d</sup> Germany distinguishes between private and public buyers, with Treuarbeit offering guarantees for export to public buyers (Buergerchaften) and Hermes for private buyers (Garantie). In centrally planned economies the importer is always the state, so we presume that exports to the Soviet bloc are guaranteed by Treuarbeit.

<sup>e</sup> Reinsured by EXIM Bank.

to 20 percent and tend to be higher for shorter-term contracts and consumer goods and raw materials.

COFACE charges its premiums in two portions. The first portion is paid directly and is fixed for each type (political risk, commercial risk, or combined) and term of policy. The second portion is paid indirectly and is determined for each specific contract according to COFACE's assessment of the risk. These risk premiums are treated as confidential. COFACE requires the exporter to factor the latter charge into the contract price.

FRG operates its export credit cover programs through a consortium of two corporations, one public and one private. The public corporation, Treuarbeit (a public accounting firm), does not deal directly with either exporters or private buyers. Clients deal with the private corporation, Hermes (Hermes Kreditversicherungs-AG). All policies cover both political and commercial risks. Premiums are fixed and are not adjusted for the riskiness of individual contracts. Premiums do, however, differ for public and private buyers and are much higher for the latter (see Table A.1), presumably reflecting the higher commercial risk. The premium for a sale to a public buyer varies inversely with the size of the contract.

Japan offers its exporters credit cover through an official government agency, EID (Export Insurance Division of the Ministry of International Trade and Industry). Coinsurance requirements differ for buyer and supplier credits and are higher for the latter. Premiums are determined by the credit worthiness of the importing country as rated by EID.

The United States has a very complex system for offering export credit cover. EXIM Bank coordinates cover for nonagricultural exports, while CCC provides cover for agricultural exports. Both are publicly held corporations.

CCC extends cover of sale of agricultural goods to countries enjoying most favored nation trading status with the United States. Guarantees may extend for three years, and the premium is a flat 33 points per year. There is no adjustment for riskiness.

EXIM Bank operates in cooperation with two private consortiums, FCIA (Foreign Credit Insurance Association), and PEFCO (Private Export Funding Corporation). FCIA is a consortium of private insurance companies that offers cover against commercial risks on its own account (reinsured by EXIM Bank, however) and acts as an agent for the EXIM Bank on political risk insurance. The premium for commercial cover is actually set by the EXIM Bank, which receives one quarter of the premium in return for reinsuring losses above \$750,000 per importer.[2] The EXIM Bank also offers cover independently of FCIA, for example by extending guarantees for buyer credits to private banks and unconditionally guaranteeing export loans extended by PEFCO.

As far as the assumption of export risks is concerned, there do not appear to be any glaring differences between the systems. A few of the other systems offer such innovative services as insurance against exchange risks and performance bond insurance, which are not available

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[2] E.g., if a private foreign importer cannot pay his obligation to an American exporter, the exporter will be reimbursed for 90 percent of his loss. The first \$750,000 will be covered by FCIA, the remainder by EXIM Bank. If several exporters have claims on the same importer, FCIA is still only liable for up to \$750,000 of the total reimbursements.

in the U.S. system. In most cases however, these services seem to duplicate services available elsewhere (e.g., forward exchange markets), and appear to be priced at market price equivalents. They are maintained mainly for the convenience of the exporter who can cover a multitude of risks through the same agency and frequently under the same policy.

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